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QUARTERLY PROGRESS REPORT FOR

CONTRACT NAS 9-13312

August-October 1973

"Stream Network Analysis from
Orbital and Suborbital Imagery,
Colorado River Basin, Texas"

EREP Investigation 064B

Submitted by

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November 5, 1973

(E74-10050) STREAM NETWORK ANALYSIS FROM
ORBITAL AND SUBORBITAL IMAGERY, COLORADO
RIVER BASIN, TEXAS Quarterly Progress
Report, Aug. - Oct. 1973 (Texas Univ.)
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generated is not relatively cloud free. Examination of the SL II photographs indicates that terminal stream points, bifurcation points and stream mouths can not be digitized from imagery on which heavy cloud cover obscures the drainage network. It would be better to save the film than to use it under such atmospheric conditions.

Expected Accomplishments

We expect to:

- a) Computerize all drainage basins under study from topographic maps
- b) Test the SL II photos of Bee Creek with our computer program
- c) Wait for more imagery with which to work

Significant Results (Preliminary)

Orbital SL-2 imagery (earth terrain camera S-190B), received September 5, 1973, was subjected to quantitative stream network analysis and compared to 7.5 minute topographic mapping (scale: 1/24,000) and U.S.D.A. conventional black and white aerial photography (scale: 1/22,200). Results can only be considered suggestive because detail on the SL-2 imagery was badly obscured by heavy cloud cover. The upper Bee Creek basin was chosen for analysis because it appeared in a relatively cloud-free portion of the orbital imagery. Drainage maps were drawn from the three sources (Fig. 1), digitized into a computer-compatible format, and analyzed by the W.A.T.E.R. system computer program. Even at its small scale (1/172,000) and with bad haze the orbital photo showed much drainage detail. The contour-like character of the Glen Rose Formation's resistant limestone units allowed channel definition. The errors in pattern recognition can be attributed to local areas of dense vegetation and to other areas of very high albedo caused by surficial exposure of caliche. The latter effect caused particular difficulty in the determination of drainage divides.

Status and Accomplishments

Our main effort has been directed toward developing a working system for the use of remote sensing imagery with The Water System, a computer program for watershed analyses developed at the Universities of Toronto and Purdue.

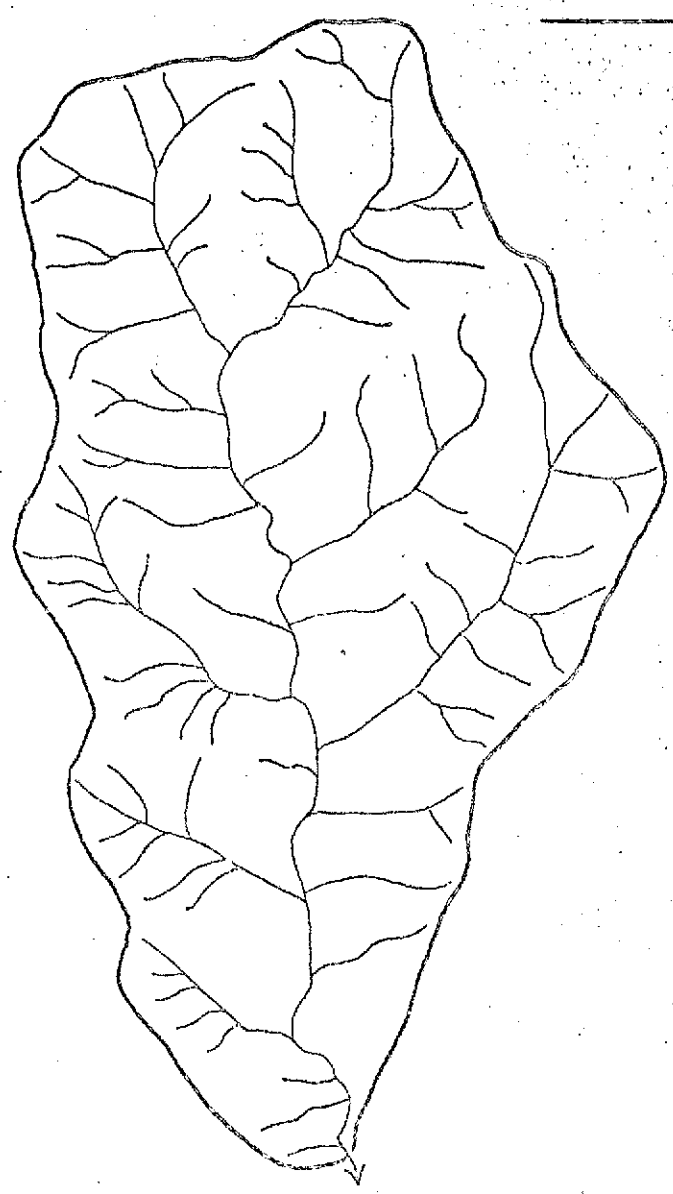
On September 5, 1973 we received our first cloud obscured imagery from SL-2. Much the data used so far has been U.S.G.S. topographic maps and conventional aerial photography. This information has been useful for testing the computer system and for providing a basis of comparison with higher quality orbital data to be supplied from SL-3 and SL-4. A sample of data analysis from these sources was enclosed with our special report of October 8, 1973.

Another important event for the quarter was that in early September ~~when~~ there was a Skylab III pass over our test site. During this imaging run we attempted a "ground truth" experiment. Just prior to and during the SL III pass we ignited (with the help of two demolition experts from Bergstrom Air Force Base) two smoke pots. These pots produced a smoke plume near the ground of 600-700 yards in length and about 200 yards in width. Unfortunately, the cloud cover was very heavy that day (about 6/10 coverage) and it may be difficult to see the smoke plume through the clouds. The smoke was dirty white in color, and of course at much lower elevation than the clouds. It is our hope that we will be able to see the continuous line of the plume because of its different color and elevation.

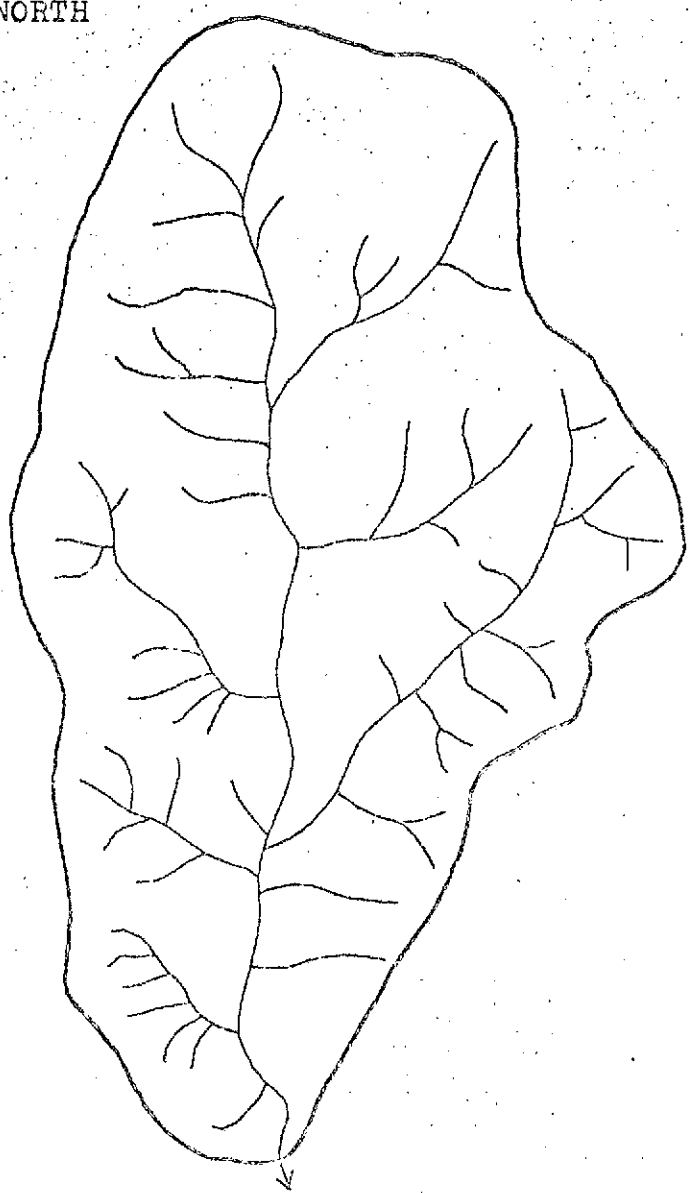
Recommendations

Our major recommendations concerning decisions for this project are that we must have imagery to work with. We have done about as much as we can through field work, computer preparation and testing computer programs. It is time to test our system on imagery. Further, it will be of little value to work if the imagery

→ NORTH



Bee Creek Basin
from topo. map
scale: 1/24,000



Bee Creek Basin
from photo mosaic
scale: 1/22,200



Bee Creek Basin
from Skylab photo
scale: 1/172,000

Some comparative morphometric properties of the basin shown in Figure 1 are summarized for the various data formats as follows:

	Topographic map	Photo Mosaic	Orbital SL2-190B
Drainage Area (mi ²)	1.81	1.60	1.98
Number of Apparent First Order Streams	82	55	26
Bifurcation ratios	4.56	3.93	5.02
Mean Length (mi)			
1st Order	.133	.133	Not
2nd Order	.211	.230	Comparable

We hope that future imagery supplied to us will be sufficiently cloud free to analyze more basins and to formulate a model that will predict the morphometry observed on largescale formats from that seen on the orbital imagery.

Summary Outlook

We have every confidence that we can perform the schedule of work on this research project, provided usable imagery is delivered by NASA. But we will need a time extension through the Summer of 1974 to prepare the final report. We would like to plan on a project completion date of August 31, 1974. The current contract completion date is June 30, 1974.

Travel Summary

We expect to continue our program of field surveys for selected drainage basins in the study area. This involves a minor amount of travel expense to the field.

We are planning to present the preliminary results to our research at the Ninth International Symposium on Remote Sensing of Environment, Ann Arbor, Michigan,

April 15-19, 1974. An advance summary of our paper is being forwarded to the symposium committee.



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November 5, 1973

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Dear Mr. Miller:

Enclosed is our second quarterly progress report for the Skylab EREP project entitled "Stream Network Analysis from Orbital and Sub-orbital Imagery, Colorado River Basin, Texas." You are also referred to the special progress report submitted by Dr. Holz, co-investigator, on October 8, 1973, and to our first quarterly progress report submitted on July 24, 1973.

Please let us know if we can provide further assistance.

Sincerely,

Victor R. Baker
Assistant Professor of Geology

VRB/bk

Enclosure

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